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(71) Applicant *(for all designated States except US)*: **SM-BIO CO., LTD.** [KR/KR]; 449-7, Ssangmoon 1-dong, Dobong-gu, 132-886 Seoul (KR).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **LEE, Wang Sup** [KR/KR]; Hanyang Apt., 703-103, 158-1, Ssangmoon 4-dong, Dobong-gu, 132-778 Seoul (KR).

(74) Agent: **PARK, Man-Soon**; 10th Fl., Woonam Bldg., 824-22, Yeoksam-dong, Kangnam-ku, 135-080 Seoul (KR).

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(54) Title: FERTILIZER CONTAINING EXCRETIONS

(57) Abstract: The present invention relates to an organic fertilizer and, more particularly, to an organic fertilizer principally comprising excretion prepared by mixing a microbial agent with swine excretion, cattle excretion and human excrement and after-ripening the mixture. The fertilizer containing excretions of the present invention is prepared by after-ripening a mixture containing 90 to 95 volume % of one selected from the group consisting of swine excretion, cattle excretion and human excrement; and 5 to 10 volume % of a microbial agent containing three of *Bacillus subtilis*, four species of *Bacillus thuringiensis*, one species of *Pseudomonas aeruginos* three species of *Arthrobactor* genus, one species of *Cellulomonas uda*, one species of *Bacillus megaterium*, one species of *Micrococcus*genus, one species of *Thiobacillus novellas* genus, and one species of *Sccaromyces cerevisiae*. The fertilizer containing excretions of the present invention functions as a fertilizer for crops, improves the physical, chemical and biological characteristics of the soil and has a latent effect. There are various kinds of the fertilizer containing excretions and the mixing ratio of the ingredients in the fertilizer containing excretions is controllable according to the characteristic of the crops.

FERTILIZER CONTAINING EXCRETIONS

Technical Field

The present invention relates to an organic fertilizer and, more particularly, to an organic fertilizer principally comprising excretion prepared by mixing a microbial agent with swine excretion, cattle excretion and human excrement and after-ripening the mixture.

Background Art

Recently, demands of agricultural products are increased rapidly with an rapid increase of population, but effective farm lands are considerably reduced due to the growth of cities, and thereby agricultural productivity is also considerably reduced. Therefore, in future, it is estimated that it is difficult to provide agricultural products as much as they are demanded. Furthermore, the indiscreet use of chemical materials, such as chemical fertilizer, agricultural chemicals, and so on, for the last 30 years, causes destroy of the ecosystem and pollution of soil and water quality, and thereby, ingredients of the agricultural chemicals remaining in the agricultural products are absorbed and accumulated into a human's body as they are. So, the Ministry of Health and Social laid down a strong countermeasure that, from January 1, 1992, residual ingredients of highly toxic fertilizers of 32 items were restricted in connection with 56 kinds of agricultural products in which 10 kinds of cereals including rice, 26 kinds of vegetables, and 20 kinds of fruits were included, and if they exceeded a standard value, the agricultural products would be gathered unconditionally and abolished and farmers producing the agricultural products would be prosecuted.

Recently, to solve the above problems, the use of chemical fertilizers and agricultural chemicals is gradually reduced and the use of compost is gradually increased. Especially, an organic farming method for producing agricultural products using the compost alone has been spread. In the organic farming method, synthetic chemical compounds, such as chemical fertilizers, organic and synthetic agricultural chemicals, stock feed additives, and so on, are not used and only natural materials, such as organic materials, natural mineral, microorganisms, and so on, are used. The organic farming method can maintain the agricultural productivity continuously and satisfy demands of the agricultural products in economic and environmental aspects. Therefore, to maintain the agricultural productivity, it is necessary to secure healthiness of soil through an environmental conservation type farming. Especially, a long-term use of chemical fertilizer causes not only acidification of soil but also deterioration of physical property of the soil due to salt accumulation within the soil, thereby reducing a potential agricultural productivity. So, it is necessary to maintain or promote fertility of the soil through a low input sustainable agriculture(LISA) for reducing an use amount of chemical fertilizer and through a constant compost use.

The most important factor to valuate fertility of the soil is soil humus. The organic content of the soil is valuated as the most important factor determining the fertility of farm land soil.

Recently, the demand of compost has been rapidly increased based on farmhouses pursuing protected-cultivation or new farming methods, and organic materials have various characteristics as follows.

First, the organic material has an effect as nutriment supply source of plants. The soil humus facilitates supply of a large quantity of or a small quantity of nutriment elements, thereby providing the agricultural products with nutriment slow-actively

and continuously, differently with chemical fertilizer. Especially, the soil humus can facilitate photosynthesis of the plants by emitting carbon dioxide during a decomposition process, and provide the agricultural products with plant-growth acceleration material.

Second, the organic material has an effect to improve physicochemical property of the soil. The soil humus has an effect to improve physical property of the soil by increasing a pore distribution of the soil by aggregating soil particles, making water-permeability, water-retentivity and air-permeability good, and preventing soil erosion by rainfall. Because the soil humus is greater in positive ion exchange capacity than clay of the soil, the soil being rich in humus can improve buffering capacity. Meanwhile, because serving as a chelate agent, the humus can increase fruitful power of soil phosphoric acid as well as restrict generation of active aluminum and prevent fixation of phosphoric acid.

Third, the organic material has an effect to maintain and promote biota and activity of the soil. If the humus content of the soil is increased, the number of medium and small organisms and microorganisms are increased and the kinds of the organisms are varied, and thereby, the biota becomes stable. As the result, material circulation capacity is increased, and a biological soil buffering function is reinforced. Furthermore, the number and activity of microorganisms in the soil is increased, so that functions to decompose, remove and stabilize noxious materials are increased.

As presently distributed organic and by-product fertilizer, stock-excretion composts are mainly used. Several companies manufacturing by-product fertilizer have manufacture and provide fertilizer using industrial wastes as raw materials.

For the by-product fertilizer, 12 process standards in relation to compost, animal excretion, decomposed chaff, ash, complex fertilizer, excretion detritus, humus,

amino acid fermentable by-product fertilizer, dry chicken excretion, dry livestock waste, decomposed hulls and sawdust, microbial materials in the soil are provided. The organic fertilizer applies the content of fertilizer ingredients, such as nitrogen, phosphoric acid, potassium, and so on, as a restriction standard to the process standards.

The livestock excretion is a traditional organic material, which has been used compost material for a long time. There is somewhat difference in a C/N ratio according to kinds of animals; chicken excretion being 8.4%, swine excretion being 11.5%, and cattle excretion being 20.1%. Phosphoric acid is contained in the chicken excretion, swine excretion and cattle excretion in a ratio of 4.84%: 5.99%: 2.80% respectively. Potassium is contained in the chicken excretion, swine excretion and cattle excretion in a ratio of 0.29%: 0.26%: 0.23%. The livestock excretion is higher in phosphoric acid content than other organic waster. In other hand, the livestock excretion is still lower in heavy metal content than industrial wastes.

Most of organic fertilizers distributed now are fermented compost made using microbial agent with livestock excretion, sawdust, and so on. Such compost has a soil improvement effect and a soil acidity control effect, which are not given in chemical fertilizer. However, chemical fertilizer has several advantages that it is inexpensive, convenient in handling and quick in effect and object ingredients can be controlled arbitrarily. However, compost has several disadvantages that it is expensive, the object nutriment ingredients cannot be controlled, noxious materials can be mixed, and basic materials can be accumulated.

Furthermore, because cases that the organic and by-product fertilizers within the restriction system area are not reached the process standard occur frequently, and the farmhouses are damaged by goods illegally distributed out of the restriction system

area, concerns about the organic and by-product fertilizers are increasing. Causes of the farmhouse damage due to the use of the illegal goods are the use of inferior raw materials and inadequate compost manufacturing technique. A basic cause that farmers use such inferior compost is that high-quality by-product fertilizer is very expensive.

The compost distributed now is higher in fertilizer ingredients than the past compost supplied to the farmhouses. However, the long-time use of excessive organic materials to increase fertility of soil may cause not increase of organic materials in the soil but increase of basic content and accumulation of excessive nitric acid in the plants. Therefore, it is a pressing need to take a measure to damages due to salt accumulation in the soil, which occurs due to the use of organic materials.

Disclosure of Invention

Accordingly, the present invention is to provide a fertilizer containing excretions functioning as a fertilizer for crops and improving the physical, chemical and biological characteristics of the soil, which fertilizer containing excretions has a latent effect and is various in types and controllable in the mixing ratio of the ingredients according to the characteristic of the crops.

To achieve the above object of the present invention, there is provided a fertilizer containing excretions being prepared by after-ripening a mixture containing 90 to 95 volume % of one selected from the group consisting of swine excretion, cattle excretion and human excrement; and 5 to 10 volume % of a microbial agent containing three species of *Bacillus subtilis*, four species of *Bacillus thuringiensis*, one species of *Pseudomonas aeruginosa*, three species of *Arthrobactor* genus, one species of *Cellulomonas uda*, one species of *Bacillus megaterium*, one species of

Micrococcus genus, one species of *Thiobacillus novellas* genus, and one species of *Saccaromyces cerevisiae*.

Hereinafter, the present invention will be described in detail.

A measure for conserving the agricultural environment and supporting the agricultural productivity is to use composted excretion. The use of the composted excretion is convenient to handle, less stinking with reduced seepage water and effective in restraining weeds and disease-causing germs. Furthermore, the use of the compost improves the physical, chemical and biological characteristics of the soil. Compared with chemical fertilizers, the compost containing a smaller amount of the fertilizer component and having a latent effect causes less accumulation of salts in the soil.

Accordingly, the inventor of this invention has developed a fertilizer containing excretions mixed with a microbial agent, as a fertilizer for improving the physical, chemical and biological characteristics of the soil. In particular, the fertilizer containing excretions of the present invention makes the use of human excrement, which is otherwise difficult to use and handle and has been dumped in a large amount. Thus the use of the fertilizer containing excretions of the present invention can reduce the cost for disposal of human excrement.

The fertilizer containing excretions of the present invention is prepared by mixing, as a principal component, any one of swine excretion, cattle excretion and human excrement with the microbial agent, and then after-ripening the mixture. The content of the excretion is 90 to 95 volume % and that of the microbial agent is 5 to 10 volume %.

The microbial agent contains microbes that have an optimal effect under the after-ripening conditions for after-ripening for one month in a closed space at a

temperature of 30 to 50 °C and a moisture content of 15 to 20 %. The microbial agent contains three species of *Bacillus subtilis*, four species of *Bacillus thuringiensis*, one species of *Pseudomonas aeruginosa*, three species of *Arthrobactor* genus, one species of *Cellulomonas uda*, one species of *Bacillus megaterium*, one species of *Micrococcus* genus, one species of *Thiobacillus novellas* genus, and one species of *Saccaromyces cerevisiae*. These 16 species of microbes have their unique decomposition characteristic. Most of the non-decomposable compounds contain complex and various functional groups. So, the use of microbes capable of decomposing a different functional group is necessary in order to decompose the non-decomposable compounds.

Namely, the 16 species of microbes react at a different functional site of the non-decomposable compounds and exert the synergistic effect together. For a complete decomposition of excretion, which contains various non-decomposable compounds, the present invention makes the use of the synergistic effect of the microbes having various decomposing properties.

In a conventional method, the mixture of excretion and sawdust is treated with the microbial agent. But there is no case of treating only the excretion with the microbial agent as in the present invention.

The combination of excretion available in the present invention may include swine excretion; cattle excretion; human excrement; swine excretion and human excrement; cattle excretion and human excrement; swine excretion and cattle excretion; swine excretion; or cattle excretion and human excrement. Preferably, the content of the excretion is 90 to 95 volume %. The content of the individual excretion in combination of at least two excretions can be properly controlled according to the characteristic of the crops.

Preferably, the microbial agent is Oil Sponge™ (supplied by Phase III Company, U.S.A.), which contains all the 16 species of microbes. Only a part of the microbes included in the product incorporated with a nutritive substance hardly have an optimal effect. The Oil Sponge, which is non-toxic and incorrodible, recovers the contaminated soil so as not to damage the ecosystem.

Best mode for carrying out the Invention

Example

The present invention will now be described in detail in connection with preferred embodiments.

First, the Oil Sponge was mixed with five excretions at a mixing ratio of Table 1 and the respective excretion mixtures were subjected to after-ripening for one month in a closed space provided on an open air field. For the after-ripening condition of the closed space, the temperature was maintained at 30 to 50 °C. The moisture content of the excretion mixtures was 15 to 20 %. After one month of after-ripening, the excretion mixtures were uniformly admixed to complete five fertilizers containing excretions.

[Table 1]

Component	Mixing Ratio (Volume %)
OS : Swine Excretion	10 : 90
OS : Cattle Excretion	10 : 90
OS : Human Excrement	10 : 90
OS : Cattle Excretion : Human Excrement	10 : 45 : 45
OS : Swine Excretion : Human Excrement	10 : 45 : 45

Note) OS: Oil Sponge

To examine the change of the acidity of the soil and the growth of crops, 15 kg of each fertilizer containing excretions prepared according to the Example was added to a test plot (60 cm × 100 cm × 12 cm). The arrangement of the test plots has two blocks as shown in the following figure, in which each block include a control plot (non-treated plot) and sample plots (chemical fertilizer-treated plots), the sample plots being arranged at random.

Block 1

G	A	C	E	F	B	D

Block 2

B	E	D	G	A	C	F

Note) A: Control Plot

B: OS + Swine Excretion

C: OS + Cattle Excretion

D: OS + Human Excrement

E: OS + Cattle Excretion + Human Excrement

F: OS + Swine Excretion + Human Excrement

G: Chemical Fertilizer

The soil treated with the fertilizer containing excretions was sowed with young radish and lettuce, which were harvested after two months. During the cultivation of the crops, the average temperature was 24.1 °C, the relative humidity 73.5 % and the amount of rainfall 1125 mm.

To examine the improvement effect of the fertilizers containing excretions on the acidity of the soil, the acidified soil was treated with each of the fertilizers containing

excretions of the Example (OS + swine excretion + human excrement, and OS + cattle excretion + human excrement) and analyzed in regard to the pH value after three months.

Also, to examine the physical and chemical characteristics of the soil treated with the fertilizer containing excretions of the present invention, the soil treated with the fertilizer containing excretions was collected immediately after treatment of the fertilizer containing excretions and after the harvest of the crops and analyzed in regard to pH, organic substance content, total microbial activity, nitrogen content and available phosphate content. Then the absorbed amounts of nitrogen, phosphate and potassium in the crops were measured to examine the growth characteristic of the harvested crops and to compare the absorbed amounts of nutriments by samples.

Improvement of pH of Soil

To demonstrate the improving effect of the fertilizer containing excretions on the pH value of the soil, the soil of which the pH value was initially 3.77 was used. This soil is much acidified because it has been treated with chemical fertilizers for the past several years. The soil was treated with the fertilizers containing excretions of the present invention (OS + swine excretion + human excrement, and OS + cattle excretion + human excrement) and measured in regard to pH value after three months. The results are presented in Table 2. The pH values of the sample plots were greatly increased. Especially, the pH values of the sample plots treated with the fertilizers containing excretions (OS + swine excretion + human excrement, and OS + cattle excretion + human excrement) were greatly increased to 5.12 and 5.30, respectively, which shows the ability of the fertilizers containing excretions to prevent the acidification of the soil.

[Table 2] Change in the acidity of the soil after treatment with fertilizer containing

excretions

Div.	Initial	After 3 months
Control	3.77	4.89
OS + Swine Excretion + Human Excrement	3.77	5.12
OS + Cattle Excretion + Human Excrement	3.77	5.30

After the harvest of the crops, the pH of the soil was increased as shown in Table 3, which shows the effect of the fertilizers containing excretions to prevent the acidification of the soil and increase the pH value of the soil. Compared with the control, the soils treated with the fertilizers containing excretions (OS + swine excretion + human excrement, and OS + cattle excretion + human excrement) had a great increase in the pH value. This shows that the effect of the fertilizers containing excretions to improve the pH of the soil can be maintained after the harvest of the crops.

[Table 3] Change in the acidity of the soil after harvest of crops

Div.	Initial	After Harvest
Control	5.96	6.01
Chemical Fertilizer	5.92	5.80
OS + Swine Excretion	6.52	6.42
OS + Cattle Excretion	6.32	6.32
OS + Human Excrement	5.97	6.07
OS + Swine Excretion + Human Excrement	5.96	6.02
OS + Cattle Excretion + Human Excrement	6.50	6.30

Increase in Organic Substance Content

The content of organic substances in the soil is an important factor to evaluate the quality of the soil. Decomposition of organic substances provide nutriments

necessary to the crops and increases the porosity of the soil to improve the air permeability and water drainage of the soil and increase water retention, thereby having the positive effects on the growth of the crops. As shown in Table 4, the content of organic substances in the soil treated with the fertilizers containing excretions was higher than that in the soil treated with the chemical fertilizer. In particular, the contents of organic substances in the soils treated with the fertilizers containing excretions (OS + swine excretion, and OS + cattle excretion + human excrement) were 6.50 and 6.65, respectively. Furthermore, the content of organic substances in the soil after the harvest of the crops had a very high value in all the sample plots. This shows that the organic substances in the soil is gradually decomposed, unlike the case of using the chemical fertilizer, and that a long-term cultivation of the crops is possible without an additional use of the fertilizers containing excretions.

[Table 4] Organic substance content (%) before and after harvest of crops

Div.	Initial	After Harvest
Control	4.15	4.55
Chemical Fertilizer	4.25	3.95
OS + Swine Excretion	6.50	6.15
OS + Cattle Excretion	6.30	5.30
OS + Human Excrement	6.15	5.60
OS + Swine Excretion + Human Excrement	5.05	4.95
OS + Cattle Excretion + Human Excrement	6.65	5.55

Increase in Activity of Microbes in Soil

The activity of microbes in the soil is an index reflecting the health of the soil. The soil having a high activity of microbes greatly helps the decomposition of the

remaining microbes and prevents invasion of disease-causing germs existing in the soil. The activity of microbes after the harvest of crops is higher in the soil treated with the fertilizers containing excretions than in the control or the sample plot treated with the chemical fertilizer, as shown in Table 5. In particular, the activity of microbes in the soil treated with the fertilizers containing excretions (OS + swine excretion, and OS + cattle excretion + human excrement) was the highest, which shows the effect of the microbial agent.

[Table 5] Comparison of activity of microbes in soil after harvest of crops

Div.	After Harvest
Control	0.182
Chemical Fertilizer	0.188
OS + Swine Excretion	0.403
OS + Cattle Excretion	0.380
OS + Human Excrement	0.295
OS + Swine Excretion + Human Excrement	0.357
OS + Cattle Excretion + Human Excrement	0.403

Content of Nutriment in Soil

The content of nutriments in soil was analyzed by measuring the contents of nitrogen and available phosphate in the soil before the cultivation of crops and after the harvest of the crops. As shown in Table 6, the nitrogen content of the soil treated with the fertilizers containing excretions before the cultivation of crops was higher than that in the control or the sample plot treated with the chemical fertilizer, which shows the effective of the fertilizer containing excretions as a nitrogen fertilizer. In particular, the nitrogen content was the highest in the soil treated with the fertilizer containing excretions (OS + cattle excretion + human excrement) so that the fertilizer containing

excretions had a remarkable effect as a nitrogen fertilizer. After the harvest of the crops, the nitrogen content was hardly changed compared to the initial nitrogen content, because nitrogen was continuously supplied for the soil from the fertilizer containing excretions. It can be seen from this result that the future cultivation of crops is possible without an addition of the fertilizer containing excretions.

The available phosphate content before the cultivation of crops was the highest in the sample-plots treated with the fertilizers containing excretions (OS + swine excretion, and OS + cattle excretion + human excrement), which demonstrated that the addition of the fertilizer containing excretions increased the amount of available phosphate. The increase in the available phosphate content is related to the effect of improving the pH of the soil. As the soil becomes neutralized, the available phosphate content increases. This result is also closely connected to the activity of microbes in the soil. Namely, the microbes in the soil decompose insoluble phosphate existing in the soil and convert it to a form directly absorbable by plants. Compared with the control, the sample plots treated with the fertilizers containing excretions had a decrease in the available phosphate content of the soil. This is closed connected to the amount of available phosphate generated in the soil and the absorption speed of the available phosphate by the plants. Namely, the crops absorbed the available phosphate in the soil. The poor growth of the crops in the control in which the available phosphate content increased retarded the absorption of the available phosphate by the crops. This result can be seen from the fact that the growth of the crops was slower in the control in relation to the sample plots.

[Table 6] Comparison of nitrogen content and available phosphate content in soil before and after cultivation of crops

Div.	Nitrogen Content (%)		Available Phosphate (ppm)	
	Initial	After Harvest	Initial	After Harvest
Control	0.077	0.164	3.37	4.96
Chemical Fertilizer	0.112	0.128	4.04	4.64
OS + Swine Excretion	0.119	0.180	5.40	4.68
OS + Cattle Excretion	0.131	0.121	4.43	4.42
OS + Human Excrement	0.129	0.131	4.06	3.76
OS + Swine Excretion + Human Excrement	0.124	0.139	3.38	4.21
OS + Cattle Excretion + Human Excrement	0.151	0.149	5.50	3.85

Amount of Nutriment Absorbed by Crops

The amount of nutriments absorbed by the crops reflects the nutritive condition of the soil. Namely, it can be used as an index for determining the level of nutriments in the soil. As can be seen from Table 7, the nitrogen content of the crops was 4.15 % in the sample plot treated with the fertilizer containing excretions (OS + cattle excretion + human excrement). Compared to the control, all the sample plots treated with the fertilizers containing excretions had the higher nitrogen content of the crops, showing that the nitrogen in the soil was sufficiently supplied for the crops. This result was the same in the two kinds of crops, i.e., young radish and lettuce, demonstrating the nitrogen fertilizing effect of the fertilizers containing excretions. The phosphate content of the crops was dependent upon the kind of the crops. For young radish, the phosphate content was higher in the sample plots treated with the fertilizers containing excretions than in the control and the sample plot treated with the

chemical fertilizer. As for lettuce, the phosphate content was high only in the sample plots treated with the fertilizers containing excretions (OS + human excrement, and OS + cattle excretion + human excrement). This shows that the use of the fertilizers containing excretions can sufficiently supply phosphate for the both crops, i.e., young radish and lettuce. The potassium content of the young radish was higher in the sample plots treated with the fertilizers containing excretions than in the control and the sample plot treated with the chemical fertilizer. Especially, it was the highest in the sample plot treated with human excrement. Likewise, the potassium content of the lettuce was the highest in the sample plot treated with human excrement. The use of the chemical fertilizer resulted in the lowest potassium content absorbed by the crops. Thus the addition of the fertilizers containing excretions supplied the potassium for the two crops sufficiently.

[Table 7] Comparison of nitrogen, phosphate and potassium absorbed by crops

Div.	Nitrogen (%)		Phosphate (ppm)		Potassium (ppm)	
	Young Radish	Lettuce	Young Radish	Lettuce	Young Radish	Lettuce
Control	2.80	2.36	6125	6496	38345	42223
Chemical Fertilizer	3.52	3.44	5732	7015	36393	33296
OS + Swine Excretion	3.67	3.28	6375	6539	41770	40919
OS + Cattle Excretion	3.02	2.73	6189	6343	39928	40807
OS + Human Excrement	3.17	2.63	6566	7773	43623	43719
OS + Swine Excretion + Human Excrement	2.96	2.78	6252	5922	39337	39226
OS + Cattle Excretion + Human Excrement	4.15	3.06	6483	7356	40119	42614

Industrial Applicability

Based on the above results, the effects of the present invention are as follows:

(1) The present invention neutralizes the acidified soil or prevents the acidification of the soil. An addition of excretion to the soil improves the physical, chemical and biological characteristics of the soil;

(2) The fertilizer containing excretions of the present invention contains a microbial agent to increase the activity of microbes in the soil. This makes the biofacies of the soil diverse and prevents crop from the damage of diseases or insects, thereby restraining the use of agricultural chemicals;

(3) The present invention has a fertilizing effect to sufficiently supply nitrogen, phosphate and potassium necessary for crops and provides nutriments for the crops for a long time with a single use. In particular, the present invention is useful as a fertilizer having a latent effect without accumulating salts in the soil that may deteriorate the quality of the soil; and

(4) The present invention provides various kinds of fertilizer containing excretions and makes it possible to control the mixing ratio of the fertilizer ingredients according to the characteristic of the crops.

While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

What is claimed is :

1. A fertilizer containing excretions being prepared by after-ripening a mixture containing 90 to 95 volume % of one selected from the group consisting of swine excretion, cattle excretion and human excrement; and 5 to 10 volume % of a microbial agent containing three species of *Bacillus subtilis*, four species of *Bacillus thuringiensis*, one species of *Pseudomonas aeruginosa*, three species of *Arthrobactor* genus, one species of *Cellulomonas uda*, one species of *Bacillus megaterium*, one species of *Micrococcus* genus, one species of *Thiobacillus novellas* genus, and one species of *Saccaromyces cerevisiae*.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC7 C05F 3/04, C05F 3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 C05F, C05G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and application for inventions since 1975
Korean Utility models and application for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NPS, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 92-672 A (JUNG SANG HYUN) 29.JANUARY.1992 See the whole document	1
Y	JP 05-301791 A (HIRAI TAKASHI) 16.NOVEMBER.1993 See the whole document	1
Y	JP 07-232984 A (NISSHIN FLOUR MILLING CO.LTD.) 05.SEPTEMBER.1995 See the whole document	1
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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 920 Dunsan-dong, Seo-gu, Daejeon Metropolitan City 302-701, Republic of Korea	RYU, Ki Hyeok
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-5559

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